

THE SCIENCE NEWS-LETTER

A Weekly Summary of Current Science

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SCIENTIFIC RESEARCH TO MAKE NEW DIRIGIBLES SAFER

Scientific research, now in progress at the U. S. Bureau of Standards, promises to make the two new dirigibles, each of 8,000,000 cubic feet capacity, the construction of which is contemplated by the government, safer than any previously built. This is the opinion of Dr. L. B. Tuckerman, assistant chief of the Bureau of Mechanics and Sound.

"For thousands of years," says Dr. Tuckerman, "man has looked upon the birds of the air and dreamed of the time when he, too, would fly, yet it is but a little over a century and a half since man first took to the air, in the balloons of Montgolfier and Charles. It is a scant quarter of a century since navigation of the air became a reality. There has not yet been time for him to learn all the dangers of the air nor for his skill to defeat them. Much already has been accomplished. In the years before the war the German Zeppelins carried over 42,000 passengers in more than 2000 flights, and after the Armistice one airship, the Bodensee, carried 2500 more passengers without a single injury to passengers or crew. Much more, however, remains to be done. The loss of the R-38, the Roma, and finally the Shenandoah warns us against over-confidence.

"Even the Polar flight of the Norge, dramatically successful though it was, shows again that only through navigating the air, can we learn to make air navigation safe. The danger to airships from ice was learned only by actual flight, and the flight of the Norge teaches us that this danger must be considered even more carefully in the future. If, after ten thousand years of building houses and 5000 years of sailing ships, human lives still are lost in the destruction of these works of man by the forces of nature, we must expect as the price of our conquest of the air a toll of human lives.

"First, the airship must be built of light, but sound and lasting materials, in particular its rigid frame-work. For this reason, the Bureau of Standards studies in its Metallurgical Division and Engineering Mechanics Section the properties of duralumin, how it is affected by heat treatment and working, how well it resists the corrosive influence of the atmosphere. Duralumin (the aluminum alloy of which the Shenandoah and Los Angeles were built) is today, when unprotected, more resistant to atmospheric corrosion, or rusting, than unprotected structural steel, but the investigations of the Bureau of Standards promise to furnish means of making it even more durable. Of these sound materials, strong and light girders must be built. So light that a man can carry one of them in his hand and yet so strong that they will carry loads of thousands of pounds. Not yet do we know how light these girders may

be constructed and still be safe but the safety of the ship is insured by testing each of its main girders in our testing machines so that we know its strength is greater than the strength for which it was designed. For the Shenandoah nearly 150 full sized girders were tested and a similar and larger program is planned for these newer ships.

"The lifting of the airship is due to the helium gas confined in the gas cells. The securing of gas cells, light and strong and impermeable, is necessary to the safety of the ship. The strength and the permeability of the gas cells are tested by the Textile Section and the Gas Section of the Bureau of Standards, and an active investigation is being carried on to secure even stronger, lighter, and more impermeable cells.

"When the ship is flown, it is necessary for its safety that the engines which drive it shall be adequate in power and reliability. The problem of a reliable airship engine is not so simple as that of a reliable automobile engine. Two factors enter into the problem which are of less importance for automobiles. In the first place, lightness of construction is essential far more than in any engine which operates on the ground and in the second place, it is necessary that the engine operate successfully under extremes of temperature and pressure never encountered by an automobile engine. Even relatively small heights interfere considerably with the running of an automobile engine, but an airship engine must not only operate satisfactorily at the temperatures and pressures at the surface of the earth but at temperatures often 30 degrees or 40 degrees below zero and pressures less than one third the airpressure at the surface of the earth, found at altitudes of 30,000 to 35,000 feet.

"The altitude chamber of the Bureau of Standards is a chamber in which engines can be tested under approximately these conditions. Refrigerating machines lower the temperature and large air pumps exhaust the air so that the engines are run under pressures and temperatures corresponding to altitudes of over 30,000 feet. All the types of airship engines used by the U. S. Navy have been tested in these chambers before being installed.

"The future of air navigation is full of promise and in that future the airship has its place distinct from that of the airplane. It is surely fitting that the United States, which gave to the world its first successful airplane, should actively advance man's final mastery of the air."

Practically all insect-eating plants grow in acid bogs where nitrogen is not available for their roots.

A Kansas City doctor declares that an experienced physician can tell the volume of blood in an individual's body by studying the palm of the hand.

AMERICA AND MONGOLIA LINKED BY FOSSIL TREES

Millions of years ago, back in the days when the dinosaurs wallowed in the swamps and laid their eggs on the shore sands and mud, America and Asia joined lands, and a great unbroken forest marched from Manchuria to Maine. This is indicated, according to Dr. Ralph W. Chaney of the Carnegie Institution of Washington, not only by the close resemblances of the trees and other plants of eastern Asia and eastern America today, but by the resemblance of the plant fossils found in Asia to those of the same geological periods found in many parts of America.

Dr. Chaney was sent by the Carnegie Institution to accompany the Third Asiatic Expedition of the American Museum of Natural History, and his especial field of investigation was the fossil plant remains found in the same sands with the dinosaur eggs and with the flint implements of the early human inhabitants.

The trees growing in Mongolia during the Cretaceous period, when the dinosaurs were laying their eggs in the sand at Shabarakh Usu, have a general resemblance to those whose fossils form the Petrified Forest of Arizona. They belonged largely to the group known as the Araucarians, now represented by the Norfolk Island Pine and other related trees found mainly in the Southern Hemisphere.

Later, in the Tertiary period, only about four or five million years ago, the forest which covered parts of Manchuria much resembled the fossil forests of California and Oregon, according to the records of the rocks in both places. Both of these fossil floras have much in common with the present-day forest of the Pacific Coast redwood belt. They were dominated by a species of sequoia closely similar to if not identical with the modern coast redwood, but also contained secondary elements such as alder, tan-oak, maple and bay.

Dr. Chaney concludes from the evidence now in hand that during all of this immensely long period Asia and North America as well have been slowly becoming drier. The redwood tree serves as an indicator plant. It requires an annual rainfall of at least forty inches, and freedom from any long season of permanent frost. Its former presence in Manchuria, which now has a rainfall of only about twenty-five inches, and its present confinement to a comparatively narrow strip of mountain country on the American Pacific slope, are arguments in support of his thesis, Dr. Chaney states. Similarly during the same period Mongolia, to the north of Manchuria and farther inland, supported a tree population indicating a semi-arid condition: mostly conifers and poplars, with belts of rushes about the occasional pools. But Mongolia is now one of the world's greatest deserts; again an indication of progressive drying up of the continent.

The natives of Mongolia, Dr. Chaney stated, were very friendly toward the American motor caravan, and willingly lent a hand on the numerous occasions when the trucks, loaded frequently to double their rated capacity, got stuck in mudholes or in bad places on the roadless desert. They were really eager, he said, for the privilege of touching the strange machines, and would trade their choicest possessions for an empty five-gallon gasoline tin, which for them was one of the marvels of the age as an improvement in water-carrying utensils. Their lives are built entirely around mutton. The flesh and milk of sheep and goats, with cheese made from the milk, are their sole foods; their tents are made of wool felt, lashed together with ropes of horse or camels' hair. Their women even dress their hair in imitation of

the horns of the rams. Their civilization, Dr. Chaney stated, is literally a culture of the sheep.

CLAIMS INVISIBLE GERM KILLER IS LIVING, BREEDING ORGANISM

"The bacteriophage is alive." So maintains Dr. F. d'Herelle, its discoverer, fronting the skeptical criticism of many other men of science, in his new book on the subject. The bacteriophage is alive, and no mere chemical phenomenon; and it maintains itself, he says, as a parasite of parasites, a deadly submicroscopic germ that kills other germs. No culture of bacteria can be "pure", as far as the bacteriophage is concerned; it is harder to find a germ without its bacteriophage accompaniment than it is to find a wooly dog without fleas in summer.

But the bacteriophage is not a mere annoyance to the germs it infests, according to Dr. d'Herelle. It kills them, just as some germs kill men and animals and plants, and then it dissolves their corpses. And just as there are special germs that attack men and not horses, and others that attack horses and not sheep, so there are special breeds of bacteriophage, each of which has its favorite germ which it attacks. But just as some germs, for example anthrax, will attack men, horses and sheep indiscriminately, so there are some varieties of bacteriophage whose appetites are equally indiscriminate, permitting them to devour several different species of bacteria. Dr. d'Herelle claims that he has succeeded in isolating single bacteriophage "corpuscles", and in breeding up pure cultures of these different strains.

According to the author, these "super-germs" are almost unimaginably small, having diameters of 20 thousandths of a thousandth of a millimeter -- and a millimeter is about a twenty-fifth of an inch. They pass readily through the pores of a very fine porcelain filter, that will stop ordinary germs as though they were marble in a colander. But one of these tiny organisms, he says, will penetrate into the body of a bacterium, and there will divide and divide again, just as a germ does in the body of a man; until the bacteriophage "family" becomes so numerous as to burst the unfortunate bacterium asunder and so cause its death.

Man and all other animal organisms habitually infested with bacteria carry about with them all the time one or more strains of bacteriophage that make war on their commonest germ enemies. When the germs get the upper hand of the bacteriophage, we are sick; when we are convalescent, Dr. d'Herelle says, our private bacteriophage strains are in a state of especial virulence against their special germ victims.

Dr. d'Herelle made his discovery of the bacteriophage while he was at the Pasteur Institute in Paris. He is now at Alexandria, Egypt, working on problems of the control of tropical diseases. The use of the bacteriophage for combating tropical plagues was forecast in literature before it was actually attempted in practice, for the hero in Sinclair Lewis' novel "Arrowsmith", is sent on an expedition to a Caribbean country to put down an epidemic.

PAGAN CEREMONIALS SURVIVE IN CENTRAL AMERICAN RELIGION

Some interesting survivals of pagan beliefs in Central America which belong to the days before the Spanish Conquest, but have lasted on under Christianity, have recently been recorded by Dr. S. K. Lothrop, anthropologist, of Boston. Such practices are usually known to anthropologists and historians as "nagualism". The Indians readily adopted the forms of the Christian religion but as the Spanish churches often stood on the sites of heathen temples and native priests frequently secreted images of their gods beneath the Christian altars, a devotee of the Christian religion might still pray to the gods of his ancestors.

The priest-doctor, too, still survives, Dr. Lothrop states. One son of a family in each generation is selected for this purpose, and he performs ceremonies at birth, marriage, in sickness and in death, which appeal directly to the ancient gods.

Up in the hills in isolated spots are found altars dedicated to the ancient gods although the cross shows that the worshippers call themselves Christians. On the altar are strewn leaves and flowers, with rounded pierced stones, ancient club heads, mixed with obsidian axe heads and flake knives. These serve to emphasize continuity with the past. Such an altar was found by Dr. Lothrop a few leagues south of Santo Thoma. Another exactly similar was found by Dr. Gann on his recent journey to Coba. Here there was a cross with the figure of Christ painted on it.

Another survival of the ancient religion found by Dr. Gann at Chemux was the custom of making votive offerings to the Virgin or a saint in the form of models in gold or silver of eyes, legs, arms, and so on, as well as waxen images of pigs and dogs. They were placed there either as offerings to drive away disease or thank-offerings for recovery either of human beings or of cattle.

The custom of making offerings of the part affected either in the hope of recovery or as a thank offering was a widespread custom in ancient Europe. In Egypt it goes back from Roman times to the early dynastic period. Models of limbs and other parts of the body have been found in Naukratis, the Greek city of Egypt, among the debris of a house in which they were manufactured, and they occur in twelfth dynasty buildings at Deir El Bahari. It was a favorite custom of shipwrecked sailors to deposit some memento of their escape in a temple. The Latin poet Horace speaks of a votive tablet and drenched garments suspended in a temple in this way, while another favorite form of offering in the Mediterranean area was the model of a ship. Such models of ships suspended with other objects were still to be seen after the war hanging from the candelabra in St. Sophia in Constantinople, though it is a Moslem place of worship.

In the northern part of the United States, 90 per cent. of the people's food is made up of five articles: bread and cereals, fats, meat, potatoes, and sugar.

PUBLIC SLOW TO BENEFIT BY GREAT MEDICAL DISCOVERIES

That the great medical discoveries made by doctors and research workers should be more fully applied, so that the public may benefit by them, was urged by Miss Elizabeth G. Fox, director of public health nursing of the American Red Cross, who spoke at the second Pan American Red Cross Conference recently.

When the germ of some dread disease is isolated, the public shows great enthusiasm, and at once mentally checks that disease off as "conquered", Miss Fox told the conference. In reality, however, the new knowledge cannot work any magic in the world until it is the property of the man in the work shop, the mother in the home, the school teacher, and the child on the playground.

The public health nurse was described by Miss Fox as the agent that is needed to work among the people in their homes, to teach them the value of disease prevention and modern medicine, to help them to get proper medical attention, and to build up for them an ideal of health.

"In this country it is estimated that only ten per cent. of the sick are cared for in hospitals," said Miss Fox. "The remaining 90 per cent. are cared for in their homes, and of this 90 per cent. perhaps less than a quarter can afford the services of a private nurse. The majority of them, and this includes people of moderate means such as professional people and those in small business, must depend upon the services of a public health nurse if they are to have skilled nursing care."

SQUARE DEAL FOR GAS CONSUMERS ASSURED

The gasoline station operator who gives his customers short measure better watch out, for the weights and measures inspector will get him, even if the oil company auditor does not.

At the National Conference on Weights and Measures held at the Bureau of Standards recently, officials from several states described their Sherlock Holmes methods for cheating cheaters. An innocent looking automobile is driven to the gas station and five gallons is put in the orthodox appearing tank, which in reality is not connected up with the feed pipe at all. After driving away the tank is emptied and the contents measured. If they do not come up to standard requirements the operator is given the opportunity to explain matters in court next morning. Fuel for the check-up automobile is supplied from an extra tank of small size to facilitate its concealment.

A check-up on the containers in which oil is sold came up for discussion. The practice of keeping oil poured out in bottles to expedite service during rush hours, lends itself to shortmeasuring fairly readily, it was stated. Standard size containers for oil sold under such conditions was recommended.

FRENCH FORM SCIENCE SERVICE

An institution similar to Science Service of Washington for the purpose of supplying to the press readable and reliable knowledge of scientific progress, has been formed in Paris under the title of "Office d'Information Scientifique at Technique", at the instigation of M. le duc de Gramont.

The board of control consists of J. L. Breton, director of the National Office of Scientific and Industrial Research and Inventions; Charles Fabry, professor at the Sorbonne and Polytechnic School, Armand de Gramont, president of the council of the Institute of Optics; Paul Janet, director of the Superior School of Electricity; Louis Lumiere of the Academy of Sciences; Louis Mangin, director of the Museum; Emile Picard, permanent secretary of the Academy of Sciences; Georges Roger, dean of the faculty of the Academy of Medicine; Emile Roux, director of the Pasteur Institute.

The Director of the Office is Lt-Colonel J. Raibaud.

The new institution will cooperate with Science Service of Washington in the exchange of news of scientific and industrial progress in France and the United States.

GERMS IGNORE DIPLOMATIC ALLIANCES

Germs and disease carrying parasites ignore national boundary lines and migrate from country to country regardless of political and diplomatic situations. As a result of the uncertain wanderings of these invisible trouble makers, the need for international health propaganda is becoming recognized all over the world, according to Dr. Rene Sand, secretary general of the League of Red Cross Societies at Paris, who attended the Pan-American Red Cross Conference in Washington.

One progressive nation cannot hope to enjoy health if its neighbors continue to cling to medieval ideas of sanitation and disease control, said Dr. Sand. If one is to advance they must advance together.

In Geneva, Paris, and Washington there are inter-governmental agencies and associations of international experts that are engaged in health diplomacy between the different countries. The League of Red Cross Societies includes 54 nations, Russia and Turkey being the only important countries not represented.

Health advertising is one of the problems which the nations are tackling together.

"The League of Red Cross Societies has in Paris the most complete collection of health posters and leaflets in existence," said Dr. Sand. "Almost every language that can be printed is represented. When health agencies of a country want to advertise health, we send them a specially selected assortment of this material, and they adapt it to get the message across in a way that their own people will understand."

Health progress in some countries is slow because of old traditions, he finds. Old conventions about women which still obtain in many South American countries make it difficult to introduce the idea of women as public health nurses or trained nurses for the home. Servants do most of the nursing there, just as they did in this country fifty years ago, said Dr. Sand.

MILK STANDARD FOR NATION ENDORSED

Uniform milk ordinances for the whole country is the aim of the United States Public Health Service. At a meeting of state and territorial health officers in conference with that body in Washington recently a resolution was adopted which will probably eventually insure uniform milk requirements in every state.

That such a measure is vitally necessary to increase the general level of milk quality and safety is the contention of the Public Health Service committee which has made a thorough survey of the milk situation during the past year.

It is believed by health officials that unification of milk control will not only increase the respect of the dairy industry for milk sanitation with consequent willingness to comply with ordinances to secure this end, but will build up the confidence of the consumer in the quality of milk and increase its consumption.

Study of conditions in the eight states that have adopted uniform regulations shows great improvement in milk sanitation following the enforcement of the ordinance, an increase of as much as eighty per cent. being noted in eight cities of Alabama, according to the committee's report.

The figures compiled show that production sanitation has been brought to a high level in a very short time in these states. In general the dairy industries have given the ordinance good support and in some cities have urged its adoption. Though it is not possible to say that the new regulation is the real cause, there is indication, the committee said, that the actual consumption of milk had increased since it has gone into effect.

GELATIN AIDS DIGESTION OF MILK AND ICE CREAM

Gelatin is a protein, but it never would be a very successful meat substitute. Its best use is as an aid to the digestion of milk when other foods are excluded from the diet, Dr. Thomas B. Downey of the Mellon Research Institute has found. Barley water, which is a member of the same class of protective colloids, has long been a common and useful component of the contents of many a baby's bottle.

"Gelatin", says Dr. Downey, "was introduced as an economy food during the period of the French Revolution. In view of the status of the knowledge of nutrition of that day, it is not surprising that there arose exaggerated opinions, both pro and con, regarding the actual food value of the product. It is only in quite recent

times that the results of earlier investigations on gelatin as a food can be interpreted with accuracy."

In his experiments with rats Dr. Downey found that it was of decided supplementary use with such natural foods as wheat, oats and barley but had little value as a major source of protein. Rats fed on milk and the average commercial variety of ice cream picked up considerably in growth and health, however, when gelatin was added to the bill of fare. He concludes that "the effects of gelatin as a colloid of the emulsoid type exert a significant influence upon digestibility and absorption where ingested with these dairy products with the exclusion of other foods. In these particular diets, the colloidal effects of gelatin may be equal in importance to, if not indeed greater than, its value as a protein."

FREQUENT OIL CHANGE DECLARED WASTE

"If the ruling frequently recommended that oil in automobile engines be changed after 500 miles running were followed we would throw away about 200,000,000 gallons of oil per annum."

So declared O.M. Burkhardt, of the Society of Automotive Engineers, at a recent meeting.

He arrived at this figure, he said, "By assuming that 20,000,000 cars, when running an average of 5000 miles per annum would change oil ten times. Each change is assumed to involve a discard of one gallon of oil. The economic loss entailed in this practice is obvious and staggering."

"The lubricating oil", he continued, "is as important to the proper functioning of an internal-combustion engine as any structural part. It is also recognized that of all the materials and finished units that enter into the construction of a complete engine there is none that changes its characteristics as rapidly as the oil. This shortcoming is well known to the majority of designers and oil refiners and, for this reason, specifications have been established after lengthy discussions to the end that lubricants shall meet with some certainty of endurance the variable conditions encountered in the operation of engines for motor vehicles."

"It is quite feasible that contaminated oil may be rectified. This is done very successfully in many branches of engineering. In the air service during the War, a necessity existed for conservation of lubricating oil. Engines have been found to remain cleaner with used than with new oil. Fifty per cent. of the engineers at the Flying Field stated that reclaimed oil was preferred to new oil while the other fifty per cent, found that it was just as good."

The tendency of merchants in some cities to open stores in residential districts is helping to decentralize business, and so to relieve traffic congestion.

TABLOID BOOK REVIEW

THE FAMILIES OF FLOWERING PLANTS. I. DICOTYLEDONS. By J. Hutchinson, F.L.S. London: Macmillan and Company. 1926.

A new botanical taxonomy is in Werden. The first-fruits of Darwin's popularization of evolution, in the middle of the last century, eventuated in the "natural system" of Engler and Prantl, which pretty thoroughly jolted the old taxonomy loose from its moorings. But it has been growing increasingly apparent that this system, like all other earthly things, is not final and must give way before some new one which better embodies the newer knowledge of the phylogeny of plants. It requires courage to undertake such a job, however, because there are few scientific fields where more diverse ideas are more stoutly defended by their proponents, than the field of botanical classification. Mr. Hutchinson apparently has this courage, and a somewhat cursory examination of his book seems to indicate that he can muster right respectable forces to defend his thesis. It seems a bit queer to find the labiates at the head of the table instead of the old familiar composites; but if botanists generally accept the new system the queerness will wear off. The contention that the composites really form a composite family, being derived from rather widely separated stocks, will be sharply challenged by some botanists, but the debate may be beneficial in clearing up a number of tough problems presented by this difficult group of plants. The illustrations in the book are worth mention: they have verve and individuality. The little distribution maps, too, are a very helpful feature.

MIDAS, or THE UNITED STATES AND THE FUTURE. By C. H. Bretherton. New York: E. P. Dutton and Co. (Today and Tomorrow Series) 1926.

Do Oxford dons wear high hats? At any rate, here is one who is very distinctly high-hatting us. From his roost on Boar's Hill he looks down (quite definitely down) on these Benighted States, and tells us, always sententiously if not always sapiently, what ails us and how we are going to get over it. Eventually. Perhaps. Some of his observations are shrewd and to the point, and one might be lulled into accepting his conclusions; but he slips upon occasional significant facts, and by his own proposed test of "tremendous trifles" betrays himself. Indeed, in the very paragraph wherein he proposes this test he chooses as his example the dyspepsia-provoking cold pumpkin pie, which he blames for everything from American teeth to American philosophy. Then he lets it be understood that pumpkin pie has a top crust! Similarly, in the body of his thesis, he states that the American negro is becoming evenly distributed over the whole country. This will be news in South Carolina. Again, he states that all policemen in New York are Irish. They are -- if Abraham and Guiseppe are typical Irish names -- But what need have we of further witnesses?

FORMAL LOGIC. By Augustus DeMorgan. London: The Open Court Company. 1926.

A great deal of first-rate experimentation and observation is wasted nowadays because the experimenters do not know how to extract all the legitimate inferences from it. More unfortunately still, some first-rate pieces of work get themselves discredited or at least looked at doubtfully because the authors infer too much. Probably all of us of the present generation could stand some drill in the rigid syllogistic thinking, if not of the Schoolmen, at least of the more modern systems of logic. This reprint of De Morgan's work of eighty years ago, therefore, is a task for which physical as well as metaphysical science owes a real debt to the editor, Prof. A. E. Taylor of Edinburgh.
